DISCOVER

4-H PHOTOGRAPHY CLUBS

EXTENSION
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4-H PHOTOGRAPHY CLUBS

Michelle Simmons | Stacey MacArthur
Utah State University Extension

Description

The Discover 4-H Clubs series guides new 4-H volunteer leaders through the process of starting a 4-H club or provides a guideline for seasoned volunteer leaders to try a new project area. Each guide outlines everything needed to organize a club and hold the first six club meetings related to a specific project area.

Purpose

The purpose is to create an environment for families to come together and participate in learning activities that can engage the whole family, while spending time together as a multi-family club. Members will experiment with new 4-H project areas.

What is 4-H?

4-H is one of the largest youth development organizations in the United States. 4-H is found in almost every county across the nation and enjoys a partnership between the U. S. Department of Agriculture (USDA), the state land-grant universities (e.g., Utah State University), and local county governments.

4-H is about youth and adults working together as partners in designing and implementing club and individual plans for activities and events. Positive youth development is the primary goal of 4-H. The project area serves as the vehicle for members to learn and master project-specific skills while developing basic life skills. All projects support the ultimate goal for the 4-H member to develop positive personal assets needed to live successfully in a diverse and changing world.

Participation in 4-H has shown many positive outcomes for youth. Specifically, 4-H participants have higher participation in civic contribution, higher grades, increased healthy habits, and higher participation in science than other youth (Learner et al., 2005).

EXTENSION
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Utah 4-H

4-H is the youth development program of Utah State University Extension and has more than 90,000 youth participants and 8,600 adult volunteers. Each county (Daggett is covered by Uintah County) has a Utah State University Extension office that administers the 4-H program.

The 4-H Motto

"To Make the Best Better!"

The 4-H Pledge

I pledge: My HEAD to clearer thinking, My HEART to greater loyalty, My HANDS to larger service and My HEALTH to better living, For my Club, my Community, my Country, and my world.

4-H Clubs

What is a 4-H Club? The club is the basic unit and foundation of 4-H. An organized club meets regularly (once a month, twice a month, weekly, etc.) under the guidance of one or more volunteer leaders, elects its own officers, plans its own program, and participates in a variety of activities. Clubs may choose to meet during the school year, only for the summer, or both.

Club Enrollment

Enroll your club with your local Extension office. Each member will need to complete a Club/member Enrollment form, Medical History form, and a Code of Conduct/Photo Release form (print these from the www.utah4h.org website or get them from the county Extension office).

Elect Club Officers

Elect club officers during one of your first club meetings. Depending on how many youth you have in your club, you can decide how many officers you would like. Typical officers will include a president, vice president, pledge leader, and secretary. Other possible officers or committees are: song leader, activity facilitator, clean-up supervisor, recreation chair, scrapbook coordinator, contact committee (email, phone, etc.), field trip committee, club photographer, etc. Pairing older members with younger members as Sr. and Jr. officers may be an effective strategy to involve a greater number of youth in leadership roles and reinforce the leadership experience for both ages. Your club may decide the duration of officers—six months, one year, etc.

A Typical Club Meeting

Follow this outline for each club meeting:

- ☐ Call to order–President
- ☐ Pledge of Allegiance and 4-H Pledge–Pledge Leader (arranges for club members to give pledges)
- ☐ Song–Song Leader (leads or arranges for club member to lead)
- ☐ Roll call–Secretary (may use an icebreaker or get acquainted type of roll call to get the meeting started)
- ☐ Minutes of the last meeting–Secretary
- ☐ Business/Announcements–Vice President
- ☐ Club Activity–arranged by Activity Facilitator and includes project, lesson, service, etc. These are outlined by project area in the following pages.
- ☐ Refreshments–arranged by Refreshment Coordinator
- ☐ Clean Up–led by Clean-up Supervisor

Essential Elements of 4-H Youth Development

The essential elements are about healthy environments. Regardless of the project area, youth need to be in environments where the following elements are present in order to foster youth development.
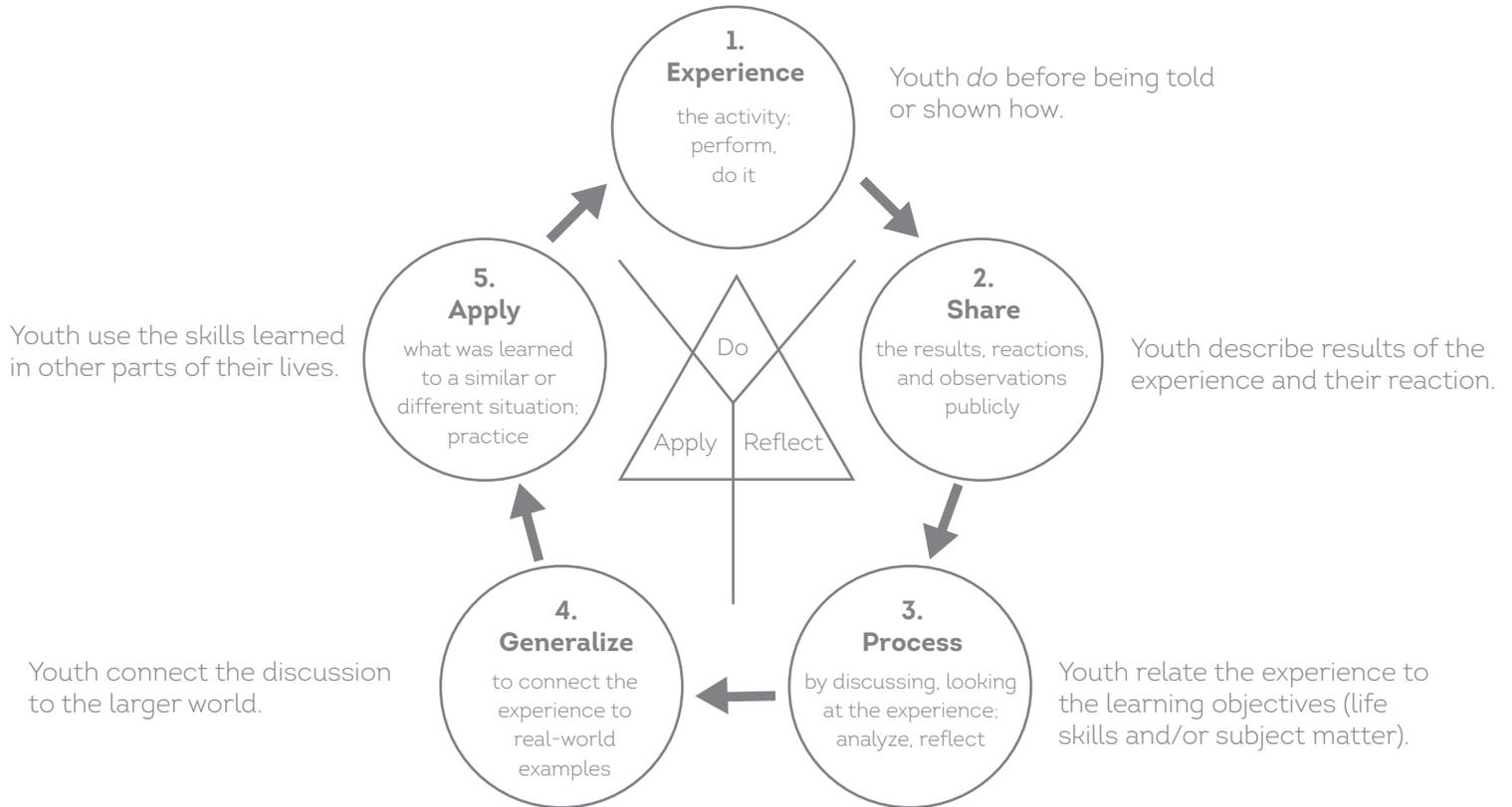
1. **Belonging**: a positive relationship with a caring adult; an inclusive and safe environment.
2. **Mastery:** engagement in learning; opportunity for mastery.
3. **Independence:** opportunity to see oneself as an active participant in the future; opportunity to make choices.
4. **Generosity:** opportunity to value and practice service to others.

(Information retrieved from: http://www.4-h.org/resource-library/professional-development-learning/4-h-youth-development/youth-development/essential-elements/)

4-H "Learning by Doing" Learning Approach

The Do, Reflect, Apply learning approach allows youth to experience the learning process with minimal guidance from adults. This allows for discovery by youth that may not take place with exact instructions.

**1.
Experience**
the activity;
perform,
do it

Youth *do* before being told
or shown how.

**5.
Apply**
what was learned
to a similar or
different situation;
practice

Youth use the skills learned
in other parts of their lives.

Do

Apply | Reflect

**2.
Share**
the results, reactions,
and observations
publicly

Youth describe results of the
experience and their reaction.

**4.
Generalize**
to connect the
experience to
real-world
examples

Youth connect the discussion
to the larger world.

**3.
Process**
by discussing, looking
at the experience;
analyze, reflect

Youth relate the experience to
the learning objectives (life
skills and/or subject matter).

4-H Mission Mandates

The mission of 4-H is to provide meaningful opportunities for youth and adults to work together to create sustainable community change. This is accomplished within three primary content areas, or mission mandates, - citizenship, healthy living, and science. These mandates reiterate the founding purposes of Extension (e.g., community leadership, quality of life, and technology transfer) in the context of 21st century challenges and opportunities. (Information retrieved from: http://www.csrees.usda.gov/nea/family/res/pdfs/Mission_Mandates.pdf)

1. **Citizenship:** connecting youth to their community, community leaders, and their role in civic affairs. This may include: civic engagement, service, civic education, and leadership.
2. **Healthy Living:** promoting healthy living to youth and their families. This includes: nutrition, fitness, social-emotional health, injury prevention, and prevention of tobacco, alcohol, and other drug use.
3. **Science:** preparing youth for science, engineering, and technology education. The core areas include: animal science and agriculture, applied mathematics, consumer science, engineering, environmental science and natural resources, life science, and technology.

Getting Started

1. Recruit one to three other families to form a club with you.
    a. Send 4-H registration form and medical/photo release form to each family (available at utah4h.org)
    b. Distribute the Discover 4-H Clubs curriculum to each family
    c. Decide on a club name
    d. Choose how often your club will meet (e.g., monthly, bi-monthly, etc.)
2. Enroll as a 4-H volunteer at the local county Extension office (invite other parents to do the same)
3. Enroll your club at the local county Extension office
    a. Sign up to receive the county 4-H newsletter from your county Extension office to stay informed about 4-H-related opportunities.
4. Identify which family/adult leader will be in charge of the first club meeting.
    a. Set a date for your first club meeting and invite the other participants.
5. Hold the first club meeting (if this is a newly formed club).
    a. See *A Typical Club Meeting* section above for a general outline.
        i. Your activity for this first club meeting will be to elect club officers and to schedule the six project area club meetings outlined in the remainder of this guide. You may also complete a-d under #1 above.
    b. At the end of the first club meeting, make a calendar outlining the adult leader in charge (in partnership with the club president) of each club meeting along with the dates, locations, and times of the remaining club meetings.
6. Hold the six project-specific club meetings outlined in this guide.
7. Continue with the same project area with the 4-H curriculum of your choice (can be obtained from the County Extension Office) OR try another Discover 4-H Club project area.

Other Resources

Utah 4-H website: www.Utah4h.org

National 4-H website: www.4h.org

4-H volunteer training:

To set up login:

http://utah4h.org/htm/volunteers/get-involved/new-volunteer-training

To start modules: http://4h.wsu.edu/volunteertraining/course.html

(password = volunteer)

References

Information was taken from the Utah 4-H website (utah4h.org), the National 4-H Website (4h.org), the Utah Volunteer Handbook, or as otherwise noted.

Lerner, R., M. et al., (2005). Positive youth development, participation in community youth development programs, and community contributions of fifth grade adolescents: Findings from the first wave of the 4-H Study of Positive Youth Development. Journal of Early Adolescence, 25(1), 17-71.

We would love feedback or suggestions on this guide; please go to the following link to take a short survey:

http://tinyurl.com/lb9tnad

4-H PHOTOGRAPHY CLUB *Meetings*

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Photography is so much more than churning out a great picture. Through photography, people learn to look a little closer and discover new ways of seeing things. By pondering subject, angle and story, members learn crucial decision making skills that help in all areas of life. Not only is photography an art of creative self-expression, it reaches into the world of science by incorporating math application, lighting necessity and building computer skills. Youth build self-esteem through creating and experiencing how others enjoy their work. Throughout this six-part discover series, participants will learn the steps to basic digital photography and discover that the fundamentals are really FUN-damentals.

Supplies
(needed for each member)

- Digital Camera (iPads, iPhones, and other smartphones are great for this, too, and will remove batteries, SD cards and case from the list of supplies).
- Batteries (rechargeable batteries last longer and are more cost efficient in the long run)
- SD card
- Carrying case for camera
- Photography etiquette handout
- Pencil
- Paper
- 2-pocket folder
- Portfolio pages for Photography (http://utah4h.org/htm/general-forms/portfolios/)
- Copies of FS1 "History of Cameras"
- Copies of FS2 "Mechanics of a Digital Camera"
- 1 standard size poster board
- Marker

Learning the *Basics*

1. START THE MEETING
Call meeting to order, do pledges, introduction of leaders/participants and announcements (club meeting dates/locations/supplies).

2. DISCUSS ETIQUETTE AND DOS AND DON'TS
Discuss photography etiquette, and create rules of dos and don'ts for picture taking activities. This website has a list of suggestions to follow when taking pictures http://photography.about.com/od/photographybyoccasion/a/PhotoEt-iquette.htm and Miss Manners wrote an appropriate article titled "Too Many Camera's May Spoil the Fun" http://news.google.com/newspapers?nid=1314&dat=20010910&id=7GRWAAAAIBAJ&sjid=cfIDAAAAIBAJ&pg=3212,9223489 that may help spark discussion on this subject. Allow youth to come up with their own rules of picture taking, Use poster board and marker to write appropriate responses and display it at club meetings.

3. HISTORY OF CAMERAS

Introduce and hand out the "History of Cameras" (see pages 18-20). **(FS1)** Allow discussion. Answer any questions. If possible bring in older model cameras and film for participants to explore. Discuss the differences between each type of camera and how they differ from the digital camera.

4. MECHANICS OF A DIGITAL CAMERA

Explore the digital camera works. Introduce and hand out the "Mechanics of a Digital Camera" (see pages 21-23). **(FS2)**

5. LABEL THE PARTS OF A CAMERA

Create a poster board with an outline of a digital camera and provide the members with word strips to place over the appropriate parts. Put the members in teams and make a relay race for added entertainment!

6. PRACTICE A FEW SKILLS

Hand out cameras and have youth load batteries and SD card. Show how to use the wrist strap, turn camera on and off, look at the LCD screen to locate subject to be photographed and how to hold the camera steady.

7. CHOOSE A SUBJECT

Have youth decide on a subject or item to photograph and then take their first picture.

8. CREATE A GOAL

Introduce the next week's topic and encourage members to create a goal to achieve during the following meeting and have them write the goal in their portfolio-folders.

9. WRITE ABOUT THE ACTIVITY

Hand out pencils, portfolio project pages and folders. Direct youth to spend 2-5 minutes writing about the activity in the project report section of the 4-H Portfolio and discuss what could be included in the size and project scope section (Section 1a) and in the skills and knowledge learned section (Section 1b). Make sure to collect folders.
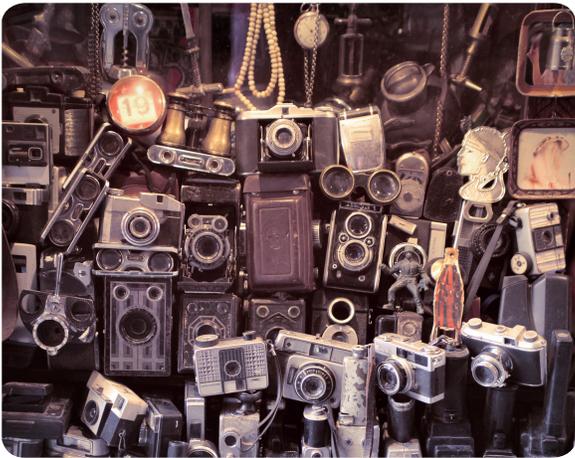
Reflect

- Why is photography important historically? (Genealogy, educational value)
- In what ways are pictures useful? (Help communicate ideas with more clarity, crime prevention)
- Why is it important to use good manners when taking pictures?

Apply

- What did you learn today that might help you when taking pictures?
- In what way can photography be used in your other hobbies?

References

"History of Cameras" (Stephen Sagers/Ron Patterson Fact Sheet; http://extension.usu.edu/files/publications/publication/4-H_Photography_2010-01pr.pdf)

"Mechanics of a Digital Camera" (Stephen Sagers/Ron Patterson Fact Sheet; http://extension.usu.edu/files/publications/publication/4-H_Photography_2010-02pr.pdf)

Supplies
(needed for each member)

- Copies of FS3 "Aperture and Digital Photography"
- Copies of FS4 "Shutter Speed in Digital Photography"

Exploring the *Settings*

1. START THE MEETING
Call meeting to order, do pledges, introduction of leaders/participants and announcements (club meeting dates/locations/supplies).

2. REVIEW AND RE-TEACH
Review last meeting and re-teach any areas where youth may need additional instruction.

3. WHAT DO ALL THOSE SETTINGS MEAN?
Introduce and hand out the "Aperture and Digital Photography" (see pages 24-27) **(FS3)** and "Shutter Speed in Digital Photography" (see pages 28-31) **(FS4)** factsheets. Use the rest of the activity time letting members take pictures of the same object in each mode to discover what differences are achieved in each photograph. Record them using the scientific method. 1. How does each setting affect my photograph? 2. How do I think each setting will affect my photograph? 3. Take pictures of the same item/subject with each setting. 4. Analyze the results and state your findings. 5. Share your findings with the rest of the group.

4. CREATE A GOAL
Introduce the next week's topic and encourage members to create a goal to achieve during the following meeting and have them write the goal in their portfolio-folder.

5. WRITE ABOUT THE ACTIVITY
Hand out pencils, portfolio project pages and folders. Direct youth to spend 2-5 minutes writing about the activity in the project report section of the 4-H Portfolio and discuss what could be included in the size and project scope section (Section 1a) and in the skills and knowledge learned section (Section 1b). Make sure to collect folders.

Reflect

- How did using a different setting affect your picture?
- How do you decide what setting to use when taking a photograph?

Apply

- In regards to the scientific model you used to record your experiment, what differences/similarities did you notice?
- Why would you use different settings?

References

"Aperture and Digital Photography" (Stephen Sagers/ Ron Patterson Fact Sheet: http://extension.usu.edu/files/publications/publication/4H_Photography_2012-02pr.pdf)

"Shutter Speed in Digital Photography" (Stephen Sagers/Ron Patterson Fact Sheet: http://extension.usu.edu/files/publications/publication/4H_Photography_2012-03pr.pdf)

Composition, Indoor/Outdoor Picture Taking

Supplies
(needed for each member)

- Copies of FS5 "Photo Composition"
- Copies of FS6 "Indoor Photography"
- Copies of FS7 "Recording Proper Outdoor Lighting"

Learning a few *Skills*

1. START THE MEETING
Call meeting to order, do pledges, introduction of leaders/participants and announcements (club meeting dates/locations/supplies).

2. REVIEW AND RE-TEACH
Review last meeting and re-teach any areas where youth may need additional instruction.

3. PHOTO COMPOSITION
Practice makes perfect! Pass out and review the "Photo Composition" handout (see pages 32-35) **(FS5).** Instruct members to practice the methods found in the fact sheet and record their initial and final results.

4. INDOOR PHOTOGRAPHY
Pass out and review the "Indoor Photography" handout (see pages 36-39) **(FS6)**. Instruct members to practice the methods found in the fact sheet and record their initial and final results.

5. OUTDOOR PHOTOGRAPHY
Pass out and review the "Recording Proper Outdoor Lighting" handout (see pages 40-43) **(FS7)**. Take members outside (if permitted) and instruct them to practice the methods found in the fact sheet and record their initial and final results.

6. PLAN THE NEXT MEETING

Introduce the next week's topic of planning and preparing for a photo shoot and encourage members to decide on a topic (family portraits, nature, etc.) and write a list in their portfolio-folder of a few poses/shots they would like to take. Also have them include a list of items (if any) they will need to use as props at the next meeting.

7. WRITE ABOUT THE ACTIVITY

Hand out pencils, portfolio project pages and folders. Direct youth to spend 2-5 minutes writing about the activity in the project report section of the 4-H Portfolio and discuss what could be included in the size and project scope section (Section 1a) and in the skills and knowledge learned section (Section 1b). Make sure to collect folders.

Reflect
- How is lighting important in taking pictures?
- Which was your favorite of all the pictures you took today and why?

Apply
- How is aperture useful for special effects?
- When taking still pictures of moving objects, what is the lowest speed one should use to avoid blurring?

References

"Photo Composition" (Stephen Sagers/Ron Patterson Fact Sheet: http://extension.usu.edu/files/publications/publication/4-H_Photography_2011-01pr.pdf)

"Indoor Photography" (Stephen Sagers/Ron Patterson Fact Sheet: http://extension.usu.edu/files/publications/publication/4-H_Photography_2011-02pr.pdf)

"Recording Proper Outdoor Lighting" (Stephen Sagers/Ron Patterson: http://extension.usu.edu/files/publications/publication/4-H_Photography_2011-03pr.pdf)

Supplies
(needed for each member)

• Models or props (if wanted) for photo shoot

Photo *Shoot*

1. START THE MEETING
Call meeting to order, do pledges, introduction of leaders/participants and announcements (club meeting dates/locations/supplies).

2. REVIEW AND RE-TEACH
Review last meeting and re-teach any areas where youth may need additional instruction.

3. PHOTO SHOOT
Today is the photo shoot. Allow members a few minutes to plan their photo shoot by deciding on a subject/theme. The following link has some great ideas for getting started http://vkreesphotography.com/creative-process-behind-the-photo-shoot/, Now turn them loose and let them be creative!

4. CREATE A GOAL
Introduce the next week's topic and encourage members to create a goal to achieve during the following meeting and have them write the goal in their portfolio-folder.

5. WRITE ABOUT THE ACTIVITY
Hand out pencils, portfolio project pages and folders. Direct youth to spend 2-5 minutes writing about the activity in the project report section of the 4-H Portfolio and discuss what could be included in the size and project scope section (Section 1a) and in the skills and knowledge learned section (Section 1b). Make sure to collect folders.

Reflect

- Why is it important to have a plan before taking pictures?
- If props and backgrounds were used, how did they enhance your photo?

Apply

- Did having a plan in place encourage more creativity as opposed to random picture taking?
- Did having a list of the pictures you wanted to take help in the overall vision for your shoot?

Supplies
(needed for each member)

- SD card
- Computer with SD card/AV cord ports and Internet access (http://picasa.google.com/)

Editing *Techniques*

1. START THE MEETING

Call meeting to order, do pledges, introduction of leaders/participants and announcements (club meeting dates/locations/supplies).

2. REVIEW AND RE-TEACH

Review last meeting and re-teach any areas where youth may need additional instruction.

3. EDITING

Instruct members to 1) Connect the camera to their computer using the camera's USB cable. 2) Turn on the camera. 3) A dialog box should appear, click Import. (If dialog box does not appear, click "Start" at the bottom left of the computer screen, go to "My Computer," find the camera icon and select and start the upload from there). Once pictures are uploaded, direct youth to http://picasa.google.com (or other site of choice) and have members choose several pictures to edit, create and save.

4. CREATE A GOAL

Introduce the next week's topic and encourage members to create a goal to achieve during the following meeting and have them write the goal in their portfolio-folder.

5. WRITE ABOUT THE ACTIVITY

Hand out pencils, portfolio project pages and folders. Direct youth to spend 2-5 minutes writing about the activity in the project report section of the 4-H Portfolio and discuss what could be included in the size and project scope section (Section 1a) and in the skills and knowledge learned section (Section 1b). Make sure to collect folders.

Reflect

• Was uploading your photos difficult?
• Was it easy to choose which photos you wanted to edit?

Apply

• How did changing the appearance of your pictures change the photo? Did it put more focus on the subject?
• Did the edits you made draw more attention to the story you were trying to tell?

Supplies

(needed for each member)

- Photo paper
- Computer with SD card/AV cord ports
- Printer
- Scissors
- Glue sticks
- Scrapbooking pages
- Embellishments (stickers, etc.)

Creating a *Story*

1. START THE MEETING

Call meeting to order, do pledges, introduction of leaders/participants and announcements (club meeting dates/locations/supplies).

2. REVIEW AND RE-TEACH

Review last meeting and re-teach any areas where youth may need additional instruction.

3. CHOOSE MATERIALS

Instruct members to decide on what scrapbook pages, stickers, etc. they would like to use.

4. PRINT PHOTOS

Have youth print off selected pictures then arrange and attach them to their scrapbook pages.

4. PRESENT

Have each member present their project to the rest of the group.

5. WRITE ABOUT THE ACTIVITY

Hand out pencils, portfolio project pages and folders. Direct youth to spend 2-5 minutes writing about the activity in the project report section of the 4-H Portfolio and discuss what could be included in the size and project scope section (Section 1a) and in the skills and knowledge learned section (Section 1b). Send portfolio-folders home so that members can add them to their existing portfolio (if any). Encourage members to use these for the county fair, recognition nights and other appropriate 4-H events.

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Reflect

- What was your favorite activity throughout the last six meetings?
- Did the time you spent choosing your pictures and deciding on what paper and other embellishments help the outcome of your scrapbook?

Apply

- Will you use photography to document any of your other activities or as a new hobby?
- After the last six meetings, would you agree that there is a lot of planning and thought that goes into taking a good picture?

Healthy Living

Youth will develop creativity and self-expression through their use of photography.

Independence

Youth will build self-esteem through creating their work and experiencing how others enjoy it.

Science

Youth will incorporate math application by working with angles, ratios, lighting, and proportion. They will also develop computer skills while learning about photo editing.

Mastery

Youth will not only learn the different parts of the camera and how to take quality pictures, but they will also learn to take a closer look and see new perspectives.

More to *Discover*

Congratulations on completing your Discover 4-H club meetings! Continue with additional curriculum in your current project area, or discover other 4-H project areas. Check out the following links for additional 4-H curriculum.

1. http://utah4h.org/htm/discover4hclubs
2. http://www.4-h.org/resource-library/curriculum/
3. http://utah4h.org/htm/resource-library/view-all-curriculum

Become a 4-H Member or Volunteer

To **register** your Utah club or individuals in your club visit:

http://www.utah-4.org/htm/staff-resources/4-h-online-support

http://utah4h.org/htm/about-4-h/newto4h/

Non-Utah residents please contact your local 4-H office:

http://www.4-h.org/get-involved/find-4-h-clubs-camps-programs/

Stay *Connected*

Visit Your County Extension Office

Stay connected with 4-H activities and news through your county Extension office. Ask about volunteer opportunities and don't forget to register for your county newsletter. Find contact information for counties in Utah here:

http://extension.usu.edu/htm/counties

Enjoy the Fair!

Enter your project or create a new project for the county fair. Learn about your county fair and fair judging here:

http://utah4h.org/htm/events-registration/county-fairs

Participate in Local or State 4-H Activities, Programs, Contests or Camps

For Utah state events and programs visit:

> http://utah4h.org/htm/events-registration

> http://www.utah4h.org/htm/featured-programs

For local Utah 4-H events and programs, visit your county Extension office.

> http://extension.usu.edu/htm/counties

Non-Utah residents, please contact your local 4-H office.

> http://www.4-h.org/get-involved/find-4-h-clubs-camps-programs/

Discover *Service*

Become a 4-H Volunteer!

> 🎥 http://www.youtube.com/watch?v=UBemO5VSyK0

> 🎥 http://www.youtube.com/watch?v=U8n4o9gHvAA

To become a 4-H volunteer in Utah, visit us at:

> http://utah4h.org/htm/about-4-h/newto4h/

Serve Together as a 4-H Club or as an Individual 4-H Member

Use your skills, passions, and 4-H to better your community and world. You are needed! Look for opportunities to help in your area or participate in service programs that reach places throughout the world (religious groups, Red Cross, etc.).

Hold a Club Service Project

USU Collegiate 4-H Club hosted "The Gift of Giving" as a club activity. Club members assembled Christmas stockings filled with needed items for CAPSA (Community Abuse Prevention Services Agency).

> http://tinyurl.com/lu5n2nc

Donate 4-H Projects

Look for hospitals, nursing homes, or other nonprofit organizations that will benefit from 4-H projects. Such projects include making quilts for CAPSA or Primary Children's Hospital, or making beanies for newborns. During Utah 4-H State Contests, 40 "smile bags" were sewn and donated to Operation Smile.

Partner with Local Businesses

92,000 pounds of processed lamb, beef, and pork were donated to the Utah Food Bank in 2013 by multiple companies.

http://tinyurl.com/pu7lxyw

Donate Money

Clubs or individuals can donate money gained from a 4-H project to a worthy cause. A nine-year-old 4-H member from Davis County donated her project money to help a three-year-old battle cancer.

http://tinyurl.com/mqtfwxo

Give Us Your *Feedback*

Help us improve Discover 4-H curriculum. We would love feedback or suggestions on this guide; please go to the following link to take a short survey:

http://tinyurl.com/lb9tnad

July 2010

History of Photography

Stephen Sagers, Tooele County 4-H Agent, Utah State University
Ron Patterson, Carbon County Ag/4-H Agent, Utah State University

Photography is derived from two Greek words *photo* and *graph*. Together they literally mean "writing with light."

The principle of the *camera obscura*, a large room that could show images on a wall, was understood by the Arab Scholar Alhazan in the 11th century, who defined the principles that would be later developed into photographs.

The most basic principle of the *camera obscura* is based on the concept that light travels in a straight line. Light reflected from a scene outside a dark room travels through a small hole in a thin membrane. The light traveling through the hole will reach the opposite wall and show the outside scene, except it is upside-down and backwards to the actual scene. This is because the light reflected from the outside scene that is below the hole travels upward through the hole and continues to a high point on the wall. The light from the high point of the outside scene travels down through the hole to a low point on the wall. The light from the left and right will also do the same. Thus, the picture on the wall is backwards and upside-down.

The hole in the membrane is the same as the aperture in the lens of modern cameras (see the Understanding Aperture fact sheet). It was discovered that adding a convex lens helped to clarify the image.
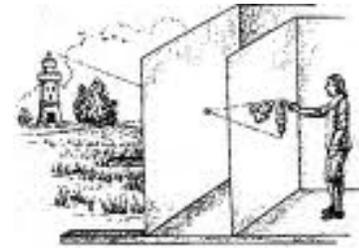
Figure 1. The camera obscura concept.

Light sensitive paper was developed in the early 1800s and photographs were taken using silver compounds to record an image. Early cameras were able to record images of still objects directly onto the paper, but the size of the picture was determined by the size of the film. The early commercial cameras, such as this Daguerreotype Camera, could not adjust the lens or enlarge photos from film.

Figure 2. An early Daguerreotype Camera.

The following photograph of Abraham Lincoln in 1847 was taken with a camera similar to the one above. In this picture Lincoln had to sit completely still for several minutes for the film paper to record the image.

Figure 3. An 1847 portrait of Abraham Lincoln.

The Invention of High Speed Photos

In the 1870s new advances in chemistry led to the ability to capture subjects in motion. Cameras were equipped with a fast moving shutter that could open and shut in a fraction of a second. It was now possible to capture the image of a crowded street such as this scene in Chicago in the 1880s.

Figure 4. Downtown Chicago, Il, Circa 1880.

As the technology advanced so did the availability of the cameras. In the 1880s, George Eastman marketed film that could fit into a consumer camera. Using the cameras, such as the one below meant the average person could shoot pictures quickly and easily with affordable equipment.

Figure 5.
A typical camera from the late 19th century.

During the 20th century features such as flashes, telephoto and wide angle lenses were developed. In the 1930s film that could be developed into color pictures became widely available to the public. Today, black and white film is still in use mostly for art applications.

Figure 6.
A typical 1930s camera with a mounted flash.

Progression of Lenses

While better film was being developed (pun intended) lenses were also being improved. The simple convex lens of the beginning did not provide a clean picture toward the edges of the photograph. Experimentation with different lens shapes used together has produced the excellent quality lenses available in modern photography.

Arguably, lenses may be the most critical component of the camera. The first lenses were mostly suitable for landscape photography. Improvements made it possible to take good portraits as long as the subject remained very still. During the 1860s the Single Reflex Lens (SLR) was invented. This lens made it possible for the same camera to use multiple types of lenses. The development of various compound lenses makes it possible to take telephoto, wide-angle, macro, and standard photographs. A good quality lens provides the photographer a lot of flexibility.

Figure 7. These lenses show the different types that are available for use in normal circumstances, telephoto, or wide angle.

Digital Cameras

The word *digital* comes from Latin roots and means "Using numbers to represent values." *Digital photography* is the process of assigning numbers in a binary code to form an image from light. Digital cameras function according to the same principles as film cameras. The technology to record an image

has changed but the principle of balancing proper lighting to record correct exposure of an image remains the same.

In 1973 Steven Sasson, an engineer for a major camera company, invented the world's first digital camera. It took 23 seconds to record a 10,000 pixel photograph. (Most cameras today can take pictures 800-1,000 times larger.) The picture was recorded onto a cassette tape and was very blurry. However, the camera shown below has served as a prototype that has revolutionized the way pictures are recorded and edited.

Figure 8 The first digital camera.

Today cameras can record detailed images of fast moving objects. Figure 9 is a fairly sophisticated camera that is available to consumers that uses a memory card to record images instead of film.

Figure 9 A modern digital camera.

Summary

The process of recording an image onto a photosensitive surface has drastically changed in the past 200 years, but the principles involved with taking pictures remain the same as they did 1000 years ago. Digital cameras have become the preferred method of many professional and amateur photographers. Digital photography is very exciting as it allows for experimental learning without any extra cost. A photographer can practice with different settings and if the picture doesn't look good the results can be seen immediately and it can be deleted.

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Mechanics of a Digital Camera

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There are many diverse concepts involved in digital photography that can be taught to kids. Artistic concepts such as the use of color and balance are techniques youth and adults can learn. There are also scientific processes and laws that are involved in the mechanics and technology of a digital camera. Principles dealing with aperture settings, shutter speed, ISO settings and computer programming are all principles incorporated into the process of a camera capturing a photograph. It is essential for youth and leaders to understand the mechanics of a camera to improve their skills as photographers.

How a Digital Camera Records an Image

When it comes to the image a photographer will see in the viewfinder there are two categories of cameras, an electronic viewfinder (EVF) camera which will usually have a fixed (non-removable) lens, and a digital single lens reflex (DSLR) camera that will usually have interchangeable lenses.

The image seen in the EVF shows up on a liquid crystal display (LCD) screen located somewhere on the body of the camera. Many EVF cameras will also have an offset optical viewfinder (OVF). That is a viewfinder on the camera that is set to the side or sometimes above the camera lens. (This is just like the old point-and-shoot film cameras.)

The main disadvantage to using the OVF is that the image seen (especially close-ups) is slightly offset from the actual image being recorded by the camera—this may cause a centering problem.

Figure 1.

EVF cameras are not typically very good for fast action shots as there is a delay after the shutter is activated before the image is recorded. Most EVF cameras offer features that can control the film speed, depth of field, and shutter speed. They can typically be used to record videos as well.

DSLR cameras require more equipment, and are generally more expensive, but usually offer more features and options for a photographer. They are very good for action photography as the image is recorded immediately. Many DSLR cameras will also have an LCD screen that can be used for composing a picture from a position that can't be reached with your eye (such as above the heads of a crowd or at ground level). However, pictures taken in this mode will experience the same time-delay problem of EVF cameras. One disadvantage with DSLR cameras is that less expensive models do not have the ability to record movies. Both cameras record images onto a light sensitive surface.

Figure 2.
Non-SLR camera with a built-in zoom lens.

Figure 3.
SLR Camera with an interchangeable lens.

Figure 4 is a simplified diagram that illustrates how a DSLR camera records an image in a way youth can understand. Cameras are much more complex, but this shows the basic mechanics of shooting a picture.
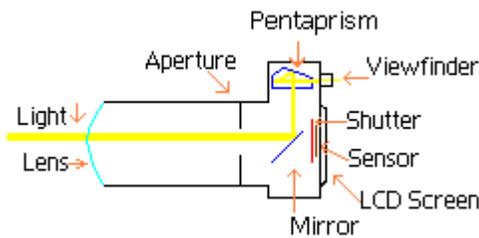

Figure 4.

When light enters the lens and passes through the aperture the image is actually upside-down and backwards in the camera. A mirror sends the image to the pentaprism, which adjusts the image upright so what we see in the viewfinder looks just like what we see in front of the camera.

Figure 5 shows the basic process of what happens when a picture is taken.
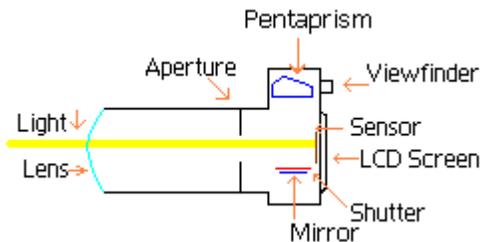
Figure 5.

Two functions occur internally when the camera shoots a picture. The mirror and shutter both move, exposing the light-sensitive sensor to the light rays coming through the lens. The sensor records the image and electronically sends the binary code to the memory chip for storage.

The amount of time that the shutter is open is referred to as the *shutter speed*. It can range from several seconds to 1/2000 of a second on most consumer cameras. The longer the shutter is open the more chance there is for a blurry picture due to subject or camera movement.

After the picture is recorded on to the sensitive surface, it is transferred in a binary code and saved to a memory card. It can then be accessed for viewing on the camera or saved and accessed by a computer.

Basic Features of a Flash

Most cameras have either a built-in flash or somewhere to mount an external flash, or both. The flash is the easiest way to compensate for a lack of light, but if it is not used correctly it can ruin the aesthetic appeal of a picture. Here are some helpful hints regarding the use a flash.

A flash is only effective on a subject at a distance of approximately 25 feet or less depending on the flash. Anything beyond that will have no effect or could illuminate objects that are in the foreground, rendering the distant subject dark and not visible in the photograph. Flashes can enhance the lighting in an area, but if they are not regulated properly they can lead to photographs of poor quality. A flash can lead to overexposed images or red eye on a human subject.

Figure 6.

LCD Screen

The LCD screen is very useful when reviewing pictures or changing menu settings on the camera. However, using the LCD screen to shoot increases

the chance of camera movement, which may result in a blurry picture and can cause a slight disparity between the actual photo and the image on the screen. It also leads to the batteries running down much faster due to the increased energy demand.

Figure 7.

Film versus Memory Cards

Film cameras are becoming rare on the market due to the versatility and quality improvements in digital photography. After the sensor records the image it is saved to a memory card. It will stay there until it is deleted. Before deletion, images may be downloaded to a computer or printed directly from the memory card.

Figure 8.

While a roll of film could hold between 24-36 pictures, a 1 gigabyte (or 1 billion byte) memory card can hold around 500 pictures depending on the

resolution setting. It is cheaper than film, and also allows the user to delete and edit images in an easier fashion than film cameras allow. This is more economical and efficient than developing a roll of film. The resolution of digital cameras has also improved to where there is no significant difference between film and digital prints.

Summary

The mechanics of digital cameras are very similar to film cameras with lenses, mirrors and shutters. The main difference lies in how the image is recorded. The electronic sensor inside a digital camera records an image that can be easily accessed by a user. The photographs can be downloaded to a computer or printed directly from the memory card.

The LCD screen on digital cameras can show saved pictures and display menu settings for camera functions. It also can be used as an alternative to the viewfinder, but this does lead to a less steady grip by the operator. The flash is also used to illuminate a room within 25 feet of the camera. Digital memory cards are capable of holding many more photos than a roll of film and editing pictures is also easier. Digital cameras are more economical to use and allow a person to easily discard the unwanted photos that was not possible with a film camera.

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Aperture and Digital Photography

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Most digital cameras, especially SLR (single lens reflex) and many higher quality non-SLR cameras, have an adjustable lens feature called the aperture. The aperture is an opening in the diaphragm of the lens. It has one basic function—let in more or less light to achieve the correct exposure. At the same time, it creates some very interesting effects. The primary effect is what it does to the depth-of-field. Depth-of-field refers to the amount of a picture, in front of and behind the subject, that is in (or nearly in) focus.

Shutter speed and film speed settings are usually better features for achieving correct exposure. This gives us greater flexibility to use the aperture setting for more artistic purposes. Savvy photographers will learn how to adjust these three elements (aperture, film speed, and shutter speed) to achieve a desired effect. (For more information on shutter speed and film speed settings see other fact sheets.)

For practical purposes it is important to be aware of how the aperture does regulate the light coming into the lens. However, this fact sheet discusses how to use the aperture setting for more creative photography. The following sections will discuss how and why the aperture can be used to increase or decrease the amount of foreground and background that is in focus.

How the Aperture Functions

In modern camera lenses, light is directed through a complex series of convex and concave lenses which magnify distant objects clearly. At some point in the lens the light rays from that image must pass through the diaphragm aperture (Figure 1) to get to the photosensitive surface.

The aperture functions according to the same principal as the pupil of an eye. As it opens wider more light will be exposed to a photosensitive surface. Figure 1 shows the similarities between the aperture and the human eye.

Figure 1. This diagram compares a diaphragm aperture's function in relation to the pupil of an eye.

The iris of the human eye will alternately constrict or relax as the level of light increases or decreases. When a camera is on auto mode it will balance the shutter speed, film speed and aperture to achieve a programmed effect.

Aperture Settings

The aperture opening on lenses may range from the setting of 1.4 to 32. Most good quality lenses range from 2.8 to 22. A lens that has a maximum aperture of 3.5 may still take good photos but will not be as good for low-light situations because the aperture is not open as wide. For purposes of this discussion we will consider a lens that has an aperture range from 2.8 to 22.

It is important to remember this is actually a ratio of the focal length inside the lens and the aperture size. These numbers are frequently referred to as the "*f*-stop." Since the number is a fraction the smaller of the two numbers is *f*/22, which indicates the smallest diameter of the aperture. An aperture setting of *f*/2.8 would be the largest diameter of the aperture. The following images serve as a guide on the ratios of the openings.

f/2.8   *f*/4   *f*/5.6   *f*/8   *f*/11   *f*/16   *f*/22
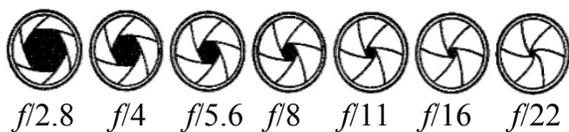
Figure 2. This diagram shows the difference in sizes of the aperture settings.

Depth of Field and the Aperture

While the aperture refers to the size of opening in the lens diaphragm as shown above, it also is the sole camera adjustment used to determine the depth-of-field. For example, a landscape shot that is clear for many miles has a deep depth-of-field or deep focus. Conversely, a portrait with a blurred background has a shallow depth-of-field or shallow focus. This is determined by the aperture setting.

There is a lot of calculus involved in calculating how the aperture controls the depth-of-field. Because of the inverse relationship between aperture and depth-of-field, a large aperture has a shallower depth-of-field, and a small aperture makes the depth-of-field deeper. Thus, more of the background and foreground may be blurrier, or clearer, depending on the aperture setting.

A way to remember how the aperture setting affects the depth-of-field is to consider just the number itself. The *f*-stop 2.8 (*f*/2.8) has a shallower depth-of-field and the *f*-stop 22 (*f*/22) has a deeper depth-of-field.

So with an f-stop of 2.8 the foreground or background will quickly become blurry. With an f-stop of 22 objects in the foreground and background lose focus much farther away from the actual focal point.

Blurred Versus Clear Background

The photographer needs to determine how much focus or blur is best for any given picture. There are some basic principles that may help make the decision easier.

A few suggestions would be:

- Keep the background clear when there is a beautiful backdrop.
- If the background or foreground helps to tell the "story" of the picture, keep it in focus.
- When the lines naturally lead to the subject keep the background clear.
- If the contours of a picture don't lead to the subject of the photo, consider blurring the background.
- Blur the background if there is a lot of unnecessary junk that detracts from the photo.

When a photographer is intentionally trying to blur the background and/or foreground, it is imperative that special attention be given to the focus on the lens. The main subject must be in focus or the shot will likely be ruined. Automatic focus on cameras can sometimes find the wrong focal point and blur the desired subject. Using the manual focus mode, if available, can be helpful. It takes practice and patience to ensure that a desirable depth of field is attained.

Figures 3 and 4 are examples of the difference aperture settings can make.

Figure 3. Aperture f/5.6. The blurry background makes the flowers stand out.

Figure 4. Aperture f/22. The smaller aperture shows the cluttery background to be in better focus and can distract from the subject of the photo.

Figure 5 is an example of a picture that was blurred to focus strictly on the desired object. The aperture was set to a wider opening and the lens zoomed in very close to the subject of the grasshoppers on the stalks of barley. Though the surrounding stalks of grain are only a few inches away, the grasshoppers at the top are the subject with the most clarity.

Figure 5. This diagram shows only a few grasshoppers in focus on a stalk of barley.

The aperture and focus can also be used to blur the foreground and background of a close-up photo. This process ensures that only a middle section is in focus. This occurs when aperture is set opened to a wide setting, and the camera focused on a point in the middle of the shot. The foreground and background blur in figure 6 so that only the desired portion of the subject stays in focus.

Figure 6. The lens was focused on the water droplets and the depth-of-field was narrowed with a mid-range aperture

Conversely, a very deep depth-of-field can be an asset when the entire background is relevant to the picture such as the photo in Figure 7.

Figure 7. This landscape shows a deep depth-of-field.

Another factor that will affect the actual depth-of-field is the distance from the camera to the subject. Even with a wide-open aperture, as the distance from the camera to the subject increases the depth-of-field will also increase. So, the depth-of-field

effects created by the aperture setting are much more evident in close-up photos.

Summary

The aperture is a very useful feature for special photographic effects. It also does regulate lighting. But that is done more easily with shutter speed and film speed. The easiest way to remember the f-stop effect on depth-of-field is that the higher number (22) will have more foreground and background in focus than the lower number (2.8).

In dark situations where a flash is not appropriate, such as at an indoor party, it may be necessary to use a larger aperture setting. Indoor images taken with a smaller aperture opening require the shutter to remain open longer and increase the possibility of the entire image becoming blurred through movement of the camera or the subject. Mastery of the aperture settings takes a lot of practice.

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Shutter Speed in Digital Photography

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Photography is the process of recording light. Film cameras recorded the light on to the film while digital cameras record light on an image sensor. In order to prevent bright or dim light from creating an overexposed or underexposed image the shutter must open and close in the right amount of time. The amount of time it is opened depends on three factors: the light intensity, the aperture setting, and the ISO or film speed. (Refer to separate factsheets on ISO and aperture for a more detailed definition of these concepts.) In order to achieve proper exposure these three features must be balanced. The shutter speed is the easiest to adjust in order to obtain proper exposure.

Exposure

In digital photography exposure refers to the amount of light that reaches the image sensor. When too much light is recorded the picture will be washed out — overexposed. When too little light is recorded the image will be dark — underexposed. Usually, neither situation is desirable.

In low light situations the ISO can be increased and/or the aperture can be opened wider. Either of these choices may alter the image's clarity, potentially yielding an undesirable image. In such situations the shutter speed can be set at a slower speed to help maintain the other desirable qualities.

Alternately, in high light situations the ISO can be decreased and/or the aperture can be adjusted smaller. However, increasing the shutter speed allows flexibility with the other two settings.

The Shutter

The shutter is located behind the lens and mirrors and opens when a photograph is taken. Most consumer cameras can shoot pictures with shutter speeds from 1/2000th of a second to several seconds (or indefinitely.) This feature is useful for freezing motion or capturing effects like fireworks or running water.

Figure 1. The inside of a film camera. The mirror and shutter behind it move when it shoots a photograph.

The shutter opens electronically on digital cameras, which makes very quick shutter speeds possible. Some cameras have a sliding screen as the shutter, while others have several thin plates that form a circular pattern capable of opening and closing from the center.

When the camera's shutter opens the light is exposed to the image's sensor as referenced in Figure 4.

Figure 2. The circular diaphragm is a precision aligned plates that can open and close in a small fraction of a second.

Figure 3. The shutter, which is the sliding screen, on this older film camera is capable of opening and shutting at 1/1000th of a second

The image sensor captures the colors and saves the photo. While the recording processes for digital and film cameras are different, the mechanics are the same. The size of the picture (megapixels) and the speed of the digital processor determine how long before the camera is ready to take the next picture.

Figure 4. The shiny surface on this old camera was where a roll of film was placed. A sensor is located there on a digital camera that records the image.

Adjusting the Shutter Speed

On most digital cameras there is a setting that allows shutter speed adjustment. Usually there is a letter **S** or another symbol that will allow a person to choose which speed is appropriate for the picture. Some of the point-and-shoot cameras will have a "manual" mode which may allow selection of shutter speed, film speed or aperture settings in the menu that displays on the LCD screen. Consult the specific camera manual to see if the shutter speed can be manually adjusted and become familiar with how to do it.

A tripod, which is a device that holds the camera still during exposure, is very helpful when the shutter speed is slower than $1/30^{th}$ second.

Figure 5 This dial shows the camera in a mode capable of adjusting the speed.

Capturing Still Shots

Generally, in order to freeze a shot of a person moving without a blur, the shutter speed should be no slower than $1/60^{th}$ second. (This does depend on how fast the individual is moving of course, a portrait can be shot at a much lower speed.) If the desired effect is a still shot involving sports, moving vehicles, or similar situations, then the speed would likely need to be set at $1/500^{th}$ second or faster such as the galloping horse in Figure 6.

Figure 6. This feral horse was frozen in mid-air with its mane and tail in still shot.

In cases where lighting is low, a flash is not appropriate, and the subject is relatively still, then a slower shutter speed allows more exposure. Taking pictures of a moving objects using shutter speeds below 1/60 of a second will likely result in a blurred image.

Figure 7. Due to the low lighting, slow shutter speed and movement of the subject this picture is blurred.

Special Effects with the Shutter

One of the most common reasons to adjust the shutter speed is for special effects. Shooting moving objects or streams of light that imply motion require adjustments to the shutter speed to achieve these special effects. While getting a fast shot allows a person to see more detail, a slower exposure gives a softer, flowing appearance.

Figure 8. This picture was shot at 1 second. This allowed the water to stream across the ice formation.
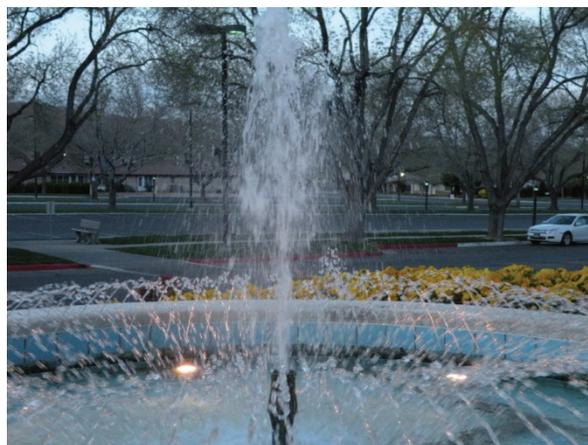
Figure 9. This picture was shot at 1/125 of a second. Instead of a flowing motion, the water droplets can be seen in detail.

Figures 8 & 9 illustrate the difference between exposure speeds and their effects with moving water. Slowing the shutter speed down allows streams to form rather than catch individual droplets. However, care must be taken to reduce the risk of overexposure. Most often, these pictures must be taken in the early morning or evening, and the aperture must be very small, to prevent overexposure from occurring.

Fireworks are another type of picture that must have shutter speed adjustments for proper exposure. It is important to have a tripod to hold the camera in position since the human body naturally sways. The slower shutter speed allows the fireworks to stream across the photo as shown in Figure 10.

Figure 10. Slower shutter speeds on a mounted tripod let the light streams from fireworks suggest motion.

The following guidelines will help you achieve suggestion of running water or fireworks. The shots are best when done in the early morning, evening, or night (if fireworks are the subject).

- Position camera on a tripod.
- Set shutter speed to 1-2 seconds.
- Set film speed (ISO) to 100 or 200.

These settings will create an effect where even small streams of water show implied motion. This is one way shutter speed adjustment can be manipulated to show certain special effects. As with any other concept, a photographer will learn through trial and error.

Figure 11. This picture of a stream shows the look of water when the shutter speed is set at 1 second.

Summary

The shutter speed is used to control how much light is exposed to the image sensor. It not only regulates the light but also allows still pictures of fast moving objects.

The shutter also is used for special effects. When shooting certain subjects, motion can be implied. It is always necessary to consider the lighting when adjusting the speed.

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Photo Composition

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Techniques Used to Improve Photos

Photography is the art of capturing an image with a camera to produce satisfying artwork. There are several elements that go into a well-composed photograph. While some people have a natural eye for composition, it is a skill that can be learned with observation and lots of practice. Digital photography makes this trial and error method of learning much less expensive.

The following topics covered in this fact sheet can be used to improve photos.

- Simplicity
- Orientation
- Distance from Subject
- Rule of Thirds
- Silhouettes
- Subject Framing

Since photography is not guided by strict rules there may be instances where these guidelines must be broken in order to achieve the desired artistic effect.

Simplicity
A photograph should tell a story. Foreground and background clutter distract from the story of the photograph, unless clutter is part of the story. A simple photograph that doesn't distract from the subject is more visually appealing than one with too many details and disorder around it. The background can be blurred by changing the aperture setting of your camera, or the photographer can change

position in relation to the subject so the background is more desirable.

Figure 1. The above photos show how moving around the subject can help to reduce some of the background "noise", but there is still a lot to distract from the subject. The aperture in these photos is f/22.

Figure 2. These two photos are the same angles as the above pictures but the aperture has been changed to f/5.6. Changing the aperture can help to almost eliminate the distraction of the background.

Orientation

Camera orientation can be used to emphasize certain elements of the subject. When taking a picture of a tall, skinny subject the camera should be turned to a vertical axis. This is also true of most portrait photographs. If the subject is a group photo, or low structure, then a horizontal orientation is usually best. Some of the photos in this sheet demonstrate how the background and subject can be more appealing if they are taken with the camera rotated 90° to a vertical orientation.

Figure 3. These photos were taken of the same subject on the same day, but they tell different stories. The camera orientation also changes the focal point.

Distance from Subject

While most digital photographs can be easily blown up to a fairly large size before becoming pixilated, it is a good practice to get as close as possible to the subject for the desired picture. It is always easier to shrink a picture than it is to crop to a small portion of the picture and blow it up to a large size. However, when taking full-body photographs of people or animals, be careful to not cut off the feet or head in the picture.

Figure 4. This picture cuts off the legs of this 4-H project (which is an important part of the story).

Figure 5. This picture tells the story of the boy and his project but also includes the stock show.

Figure 6. This picture has been cropped to focus on the boy and his successful project.

Figure 7. In this picture the closeness of the photo adds to its intimacy and appeal.

Rule of Thirds

The rule of thirds is something that will improve the aesthetics of most pictures. In many cases it even has the suggestion of movement. When you divide the picture into thirds, horizontally and vertically, the subject should be placed where the lines intersect. This will be 1/3 the distance from the bottom or top and from the left or right sides. When looking at a picture your eye will go more easily to those intersecting points. The following diagram illustrates this principle.
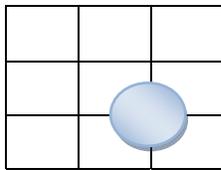
Figure 8. The subject is not directly in the center; it is 1/3 of the distance away from the bottom and right.

Silhouettes

Silhouettes can enhance the composition of a photo by creating appealing visual effects. Silhouettes are created by taking the picture from the shaded side

of the subject. A silhouette can be used to contrast portions of a photo such as the palm tree next to a moon at dusk. Creating silhouettes by contrasting shadows and light can enhance the composition of photo.
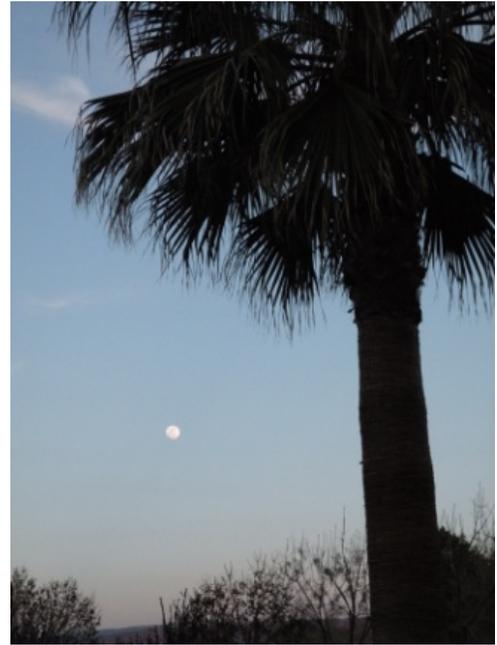
Figure 9. The dark silhouette of this palm tree has enhanced the appeal of this photo. It also follows the rule of thirds.

Another method used to enhance a photo is to darken the background. Artificially creating a shadow behind an object can make the object stand out and make the subject more noticeable. In order to do this a barrier is placed between the sun or other light source and the background. The shadow does not cover the subject, it simply shades the background, bringing greater notice to the subject.

Figure 10 A ball cap was placed behind these small desert flowers. The sun rays reflect on the flowers and the background is shaded to enhance the composition.

Subject Framing

Another concept used to make photographs more aesthetically pleasing is the "framing" of a subject. Taking a picture of something with a border around it can make it look interesting and change the dynamics of a picture and just make the overall appeal much better. This is done by shooting a subject through an artificial boundary such as an arch, a frame, or some other structure. Sometimes just the suggestion of an internal frame is enough.

Figure 11. The internal framing makes these pictures a little more unique.

Summary

Digital Cameras have become the preferred method of photography for most professionals and amateurs. While the technology used to record and edit the photo have drastically changed, the principles of good photography remains the same. Good composition is essential to quality photographs. Any deviation from these basic concepts makes it difficult to have an appealing photograph. The best method of becoming a better photographer is to practice and experiment with your camera.

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Indoor Photography

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Photography is the science of recording light in an artistic way to create a pleasing image. Indoor photography requires a photographer to become familiar with some of the built in functions of a camera. It also requires additional knowledge of the properties of light, both natural and artificial light. Indoor photography can allow for more control of the light in many instances; however, management of light becomes vital.

Lighting Options
Natural Light

Indirect, natural light has the potential to provide excellent artistic opportunities. Some buildings are designed to let in a lot of light. This can sometimes create a very good artistic setting as the light is high quality, and doesn't create harsh shadows. If the photographer is steady, the subject is relatively calm, and the shutter speed is no slower than 1/30 of a second then sharp photo images are possible.

When shooting photographs with slower shutter speeds the photographer and the subject must hold still or blurring may occur. A tripod may be necessary. However, it is also possible for blurring to add to the overall effect of the photo.

In a dimly lit room, placing the subject near an exterior window can help to create an interesting effect. The soft shadows and subdued light may provide just the right lighting. Using the window as a backlight may also create an interesting effect.

Look for those opportunities.

Figures 1 & 2. These photos show ways
light from windows can enhance the picture.

Artificial Light

Artificial light, or man-made light, does not typically have the broad spectrum of natural light.

This can unbalance the colors in a picture. It is possible to correct color problems with filters or a good quality flash.

Nearly all cameras have a built-in flash. A flash provides a brief artificial light source that is used to illuminate dark areas when the camera takes a photograph. Many cameras have several functions that regulate the flash to improve the photo.

Though a dimly lit room may not seem out of the ordinary to the human eye, it can cause underexposure of a photo and the colors will not be very vibrant. The flash is the easiest way to compensate for the lack of light in a dark setting. When used properly, it enhances the subject and makes objects more recognizable. It also makes it possible to shoot at a higher shutter speed in a dim environment, which reduces the likelihood of a blurred subject.

Figures 3 & 4 illustrate the difference a flash will make when shooting in a dark environment. Both photos were shot at the same time in automatic mode.

Figure 3. This picture was taken in a dark environment without the flash.

Figure 4. This picture was taken in a dark environment with the flash.

The first rule of flash photography to remember is that if the subject is not within 15 to 25 feet of the camera, the built-in flash on most cameras will have no effect on the photo. It only works at close range. Some cameras do have the ability to do a slow flash which can help to illuminate subjects that are farther away.

Another important point to remember with flash photography is that the harsh light can flatten the image, making the photograph less appealing.

The remainder of this fact sheet will discuss some of the problems you may run into with flash photography.
- red eyes
- shadows
- glares on photos

Red Eyes

Often a flash will produce unattractive "red eyes" in human and animal subjects. This occurs when pupils are dilated and the light reflects directly off the retina of the subject. The back of the human pupil contains cones that when hit with a bright light, reflect a red color. An external flash directed into the pupil leads to the "red eye" effect.
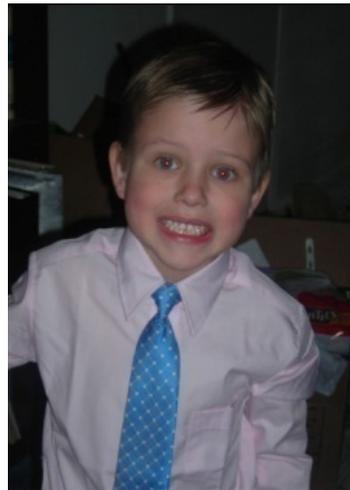

Figure 5. This image shows a subject with red eyes due to a flash hitting directly into his pupils.

The most effective way of reducing the red eye effect is to increase the light in a room. It is almost always better to solve the "red eye" problem while shooting the picture, rather than adjusting after the picture is downloaded to a computer.

When it is not possible to adjust the light in a room and a flash is necessary, there are several options to consider. Some cameras have "red-eye reduction" modes. The flash shoots prior to the camera taking an image so the iris can adjust, and later alters the photo internally if red-eye is detected.

Figure 6. This camera has a mode designed to reduce the "red eye" effect when using a flash.

Another option can be used when a flash is mounted to the camera. Most external flashes are capable of tilting up and reflecting off a ceiling or other surface. This ensures that the light does not shine directly into the eyes. Artificial lights around the person also can be used to achieve this, but they usually are bulky and cannot be used in places other than a studio.

Figure 7. Many mountable flashes can tilt up and can reflect light so it appears much softer.

A third option is to take the picture of the subject with his or her face turned slightly. Since the light is not reflecting off the back of the pupil, "red eye" will not appear, such as shown in Figure 8.

Figure 8. Turning the eyes away from a flash helps eliminate "red eye" in photos.

Most basic photo editing software programs also have a "red eye" reducing function. However, the pictures will almost always be better quality if the problem is avoided while shooting the photo.

Shadows

Shadows can add to the desired effect of a photo, but they can also be a major distraction. Shadows are typically a problem when there is only one light source, especially from a flash mounted on the camera.

Figure 9. The light from the flash causes shadows to form behind this man.

To help solve the shadow problem you might consider adding another light source at a different angle from the primary light source. Bouncing the flash off a ceiling or wall, putting an extension cable on an external flash may be another solution. A diffuser on the flash can also help to soften the shadows.

Glares on Photos

There are times when a glare can be used to enhance a photograph. However, this is typically more the exception than the rule. When it is possible, don't use a flash in a way that it becomes a direct line of light. It is better to adjust the light to come from an angle onto a subject like the sun does from the sky in the morning or evening. This can be done by rotating the flash up and reflecting it down with a white attachment or card if the flash has this capability. (See Figure 4.) A reflected flash creates a soft glow rather than a harsh glare that will cause an unattractive look such as in the photo below.

Figure 10. The direct light onto a shiny surface gives this photo an unattractive glare.

Conclusion

Indoor photography is often hindered because of a lack of enough lighting to bring out the brilliant colors in subjects. Using a nearby window can help improve light quantity and quality. Usually, the flash is the easiest way to compensate for the lack of light if a subject is within 15 to 25 feet. However, if it is not used correctly it can lead to unattractive "red eye," shadows or glares.

Studio lights are also helpful, but can be bulky and not practical for every occasion. Most modern cameras have settings to increase indoor lighting flexibility. When possible a flash should not shine directly onto a subject. An external flash may provide the capability of bouncing the light off of ceilings, walls, or other reflective surfaces.

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Recording Proper Outdoor Lighting

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The function of a camera is to record light rays. A digital camera records light rays in an electronic code. When taking pictures outdoors regulating the sun's light influences quality more than any other non-camera factor. There are several methods used to achieve the correct lighting in the outdoors. This sheet will discuss exposure and natural light, while explaining some basic functions that nearly every camera can do to overcome lighting problems.

Exposure

Exposure refers to the amount of light entering the camera. The light rays are reflecting off the surface of the subject and travel through the lens to record the image on the sensor device. Proper exposure is critical to good photography. An over-exposed picture will have very little depth or contrast between the colors and shadows.
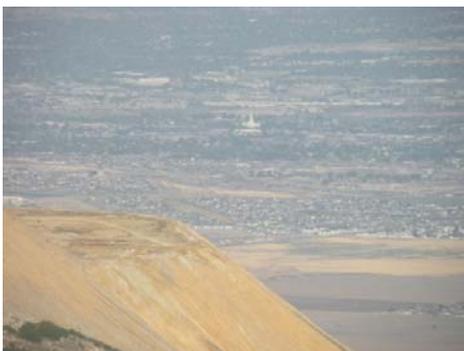

Figure 1. The picture of Salt Lake City was too bright in the afternoon sun.

Sometimes over-exposure of the subject is caused by a background that is significantly darker than the subject. This may cause a washed out subject. Similarly, underexposure of the subject may be caused by a background that is significantly lighter than the subject. This situation will result in a dark subject. The following illustrations demonstrate the need to balance exposure.

Figure 2. Extreme lighting contrast—the slightly underexposed faces are acceptable, not ideal.

Modern digital cameras try to balance out the shadows and lights in order to achieve the correct exposure. When this causes overexposure, the simplest way to deal with the problem is to move the subject in front of a background that is not quite as dark. Some cameras have the ability to tighten the area where exposure is determined. It is important to know your camera in order to overcome over-exposure problems.

Just as too much light in a picture can reduce a photograph's quality, too little light may be just as bad. Problems such as dark photos, blurring and unrecognizable images can occur when there is too little light.

A dark background may cause overexposure of the subject, but light background may cause under-exposure of the subject. A way to lighten the subject without changing the background exposure would be to use a flash. Even if the camera doesn't turn on the flash automatically, a forced flash will lighten the subject without making any change to the background exposure. Otherwise, finding a darker background will help. Another option to consider is that many cameras have the ability to allow the photographer to manually override the shutter speed, and thereby change the exposure of the subject.

Figure 3. The light foreground and background cause this subject to be underexposed.

Figure 4. Due to the dark shadows from the trees there is too little light on their faces.

Correct exposure could be defined as the amount of light energy required to achieve the goal of the photographer. Therefore, in some instances over- or underexposure may actually provide the desired effect.

Natural Light

Natural light is what you deal with when taking outdoor photographs. Different times of day and the amount of cloud cover, or other shade all have an effect on light quality and quantity.

The best quality of natural light for outdoor photography is usually found in the morning and in the evening when the sun is not too bright—colors are more vibrant and shadows are deeper. Depending on the season and the weather conditions this usually is before 10 AM and after 5 PM.

Figure 5. The sunset's rays illuminated this Castle to bring out beautiful colors in the stone.

Taking pictures at this time ensures that the excess reflected light of the sun does not cause the colors of your subject to fade. Filters designed to reduce UV light can also help overcome excess light energy during mid-day shots. In addition, factors such as cloud cover, shade

or other barriers can make lighting conditions ideal or provide aesthetically pleasing effects to the picture.
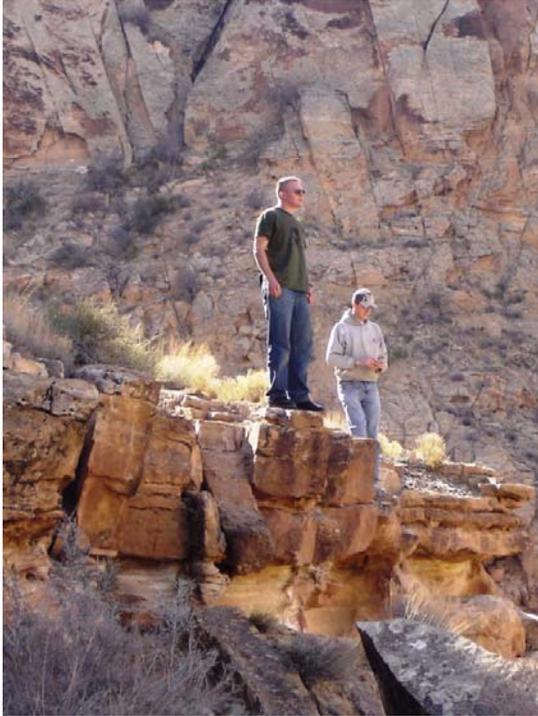

Figure 6. The light reflected off the canyon walls helps to provide good lighting for the subjects in this photo.

Figure 7. This contrast of the bright sky, lighted background and cloud cover on the subject creates a pleasing effect.
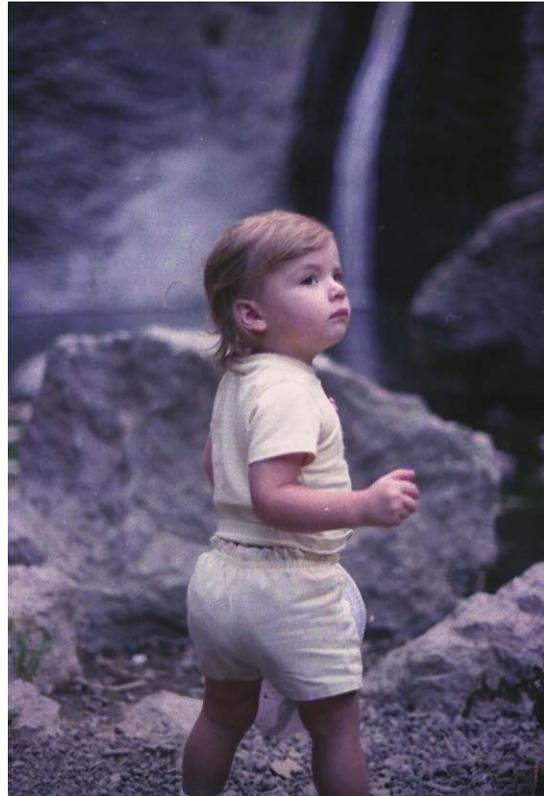

Figure 8. The filtered light at the bottom of the waterfall gives this picture the correct lighting even though it is in the middle of the day.

Another way to compensate for overexposure is to shoot the same subjects at different angles. The sun's rays hit at different angles and sometimes a subject will look very different when the camera is in a different position. The following pictures were taken a few seconds apart but at a different angle.

Figure 9. The picture on the left has too much light making the red heads appear much duller.

When taking pictures of people outdoors do not have them face directly into the sun because that tends to cause people to shade their eyes or squint into the picture. It is just as important to not face the camera directly toward the sun. This can cause unsightly sun glares in the picture.

Figure 10. Be careful to not cause the "sun salute" by having the subjects face into the sun.

Figure 11. If necessary, find a shady spot so the faces look more natural.

Figures 12. The shadows across the faces of this photo are distracting. A flash or something to reflect the sunlight back onto the subject would help reduce this effect.

Conclusion

Lighting is the most important factor in recording quality photographs. If the lighting is wrong under- or overexposure can occur, and/or subjects can blur due to movement. Outdoor photos are typically more vibrant in the early morning or evening when the sun's rays are not directly shining on the landscape.